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10/727,813

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Chris Boyer

LYNN/0165

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EXAMINER

ECHELMEYER, ALIX ELIZABETH

ART UNIT

PAPER NUMBER

1745

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/727,813

Applicant(s)

BOYER ET AL.

Examiner

Alix Elizabeth Echelmeyer

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-68 is/are pending in the application.
- 4a) Of the above claim(s) 7-17, 27, 28 and 33-68 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 18-26 and 29-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election in the reply filed on June 18, 2007 is acknowledged.

Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. Applicant elected the recombination catalyst material as platinum, the surface on which the catalyst is located as the flow field, the flow material as metal mesh, the element to which the flow field material is bonded as the bipolar plate, the type of bond as metal-to-metal— meaning claims 27 and 28 are withdrawn, and the type of bonding as welding.

3. Claims 7-17, 27, 28 and 33-68 are withdrawn. Claims 1-6, 18-26 and 29-32 are pending and are rejected for the reasons given below.

### ***Specification***

4. The disclosure is objected to because of the following informalities: on page 2, in the second paragraph under Description of the Related Art, the positive electrode is defined as the anode and the negative electrode is defined as the cathode. The opposite is true – the anode is the negative electrode, which is where hydrogen is distributed, and the cathode is the positive electrode, which is where oxygen is distributed.

Appropriate correction is required.

***Claim Interpretation***

5. The claims recite the limitation "hydrogen-oxygen recombination catalyst." The catalyst is disclosed as being a platinum catalyst with a polymer binder. For the purposes of examination, any catalyst having the same composition as the disclosed catalyst will be interpreted to have the same properties of the disclosed catalyst. Therefore, any catalyst having the same properties as disclosed will be considered a recombination catalyst.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 2, 4-6, 18-21, 23 and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Rosenfield et al. (US 2003/0091878).

Rosenfield et al. teach a fuel cell including an anode, cathode and membrane. Hydrogen is provided to the anode and air is provided to the cathode ([0015], [0050], [0150], [0173]).

Regarding claim 2, the membrane is a proton-exchange membrane ([0015]).

As for claims 1, 4, 5, 6, 21, the cathode comprises a catalyst made of a matrix of platinum in a binder ([0046]).

With regard to claims 18, 19, 20, 23, 29, the electrically conducting cathode comprises the catalyst supported on a metal mesh through which air flows to reach the membrane ([0165]). Regarding 22, since the catalyst is bonded to the mesh, the method by which it is bonded is not given patentable weight (MPEP 2113).

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 3 and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenfield et al. in view of Cisar et al. (US 6,638,657).

The teachings of Rosenfield as discussed above are incorporated herein.

Regarding claim 3, Rosenfield et al. teach the catalyst on the cathode but fail to teach that the membrane is a perfluorinated sulfonic acid polymer.

Cisar et al. teach a hydrogen/oxygen fuel cell having a perfluorinated sulfonic acid polymer membrane (column 6 line 57).

Cisar et al. further teach that, when water is formed at the cathode, as would occur in a recombination reaction, it can cause the anode face of the membrane to dry out, increasing the internal resistance. The use of a perfluorinated sulfonic acid polymer

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membrane prevents dry out and also prevents the need for additional humidification (column 6 lines 31-58).

It would be advantageous to use a perfluorinated sulfonic acid polymer membrane such as the one of Cisar et al. in the fuel cell of Rosenfield et al., since it prevents dry out and also prevents the need for additional humidification.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a perfluorinated sulfonic acid polymer membrane such as the one of Cisar et al. in the fuel cell of Rosenfield et al., since it prevents dry out and also prevents the need for additional humidification.

As for claims 24-26, Rosenfield et al. also fail to teach that the mesh flow field is welded to a bipolar plate by welding.

Cisar et al. teach a fuel cell stack, wherein the individual cells are separated by bipolar plates having expanded metal mesh flow fields on either side (column 2 lines 6-12). The separators are connected to the flow fields by spot welding (column 4 lines 50-61).

Further regarding claim 26, the order in which the bipolar plate with catalyzed cathode flow field is assembled is not given patentable weight, since the end product is the same. MPEP 2144.04 IV C.

First, it would be desirable to form several of the fuel cells of Rosenfield et al. in a stack, since it is well known in the art that stacking fuel cells yields higher voltage or current density.

It would additionally be desirable to weld the mesh flow fields of Rosenfield to a bipolar plate such as taught by Cisar et al., since welding is known in the art to provide a solid bond while not affecting electrical conductivity.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form several of the fuel cells of Rosenfield et al. in a stack, since it is well known in the art that stacking fuel cells yields higher voltage or current density, and to weld the mesh flow fields of Rosenfield to a bipolar plate such as taught by Cisar et al., since welding is known in the art to provide a solid bond while not affecting electrical conductivity.

10. Claims 30-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosenfield et al. in view of Shimotori et al. (US 6,869,709).

The teachings of Rosenfield as discussed above are incorporated herein.

Rosenfield et al. teach the hydrogen/oxygen fuel cell but fail to teach the inlet pressure of the reactants.

Shimotori et al. teach a fuel cell system wherein the pressure profile of the reactants is monitored and altered (abstract).

Shimotori et al. further teach that the inlet pressures may be manipulated to provide enhanced humidification and effective water removal, maximizing both the performance and the life of the fuel cell (abstract).

It would be desirable to manipulate the inlet reactant pressures, since such a manipulation can be used to provide enhanced humidification and effective water

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removal, maximizing both the performance and the life of the fuel cell. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. MPEP 2144.05 II B.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to manipulate the inlet reactant pressures, since such a manipulation can be used to provide enhanced humidification and effective water removal, maximizing both the performance and the life of the fuel cell.

### ***Response to Arguments***

11. Applicant's arguments, filed November 2, 2006, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made, see above.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.




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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer  
Examiner  
Art Unit 1745

aee

  
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PRIMARY EXAMINER